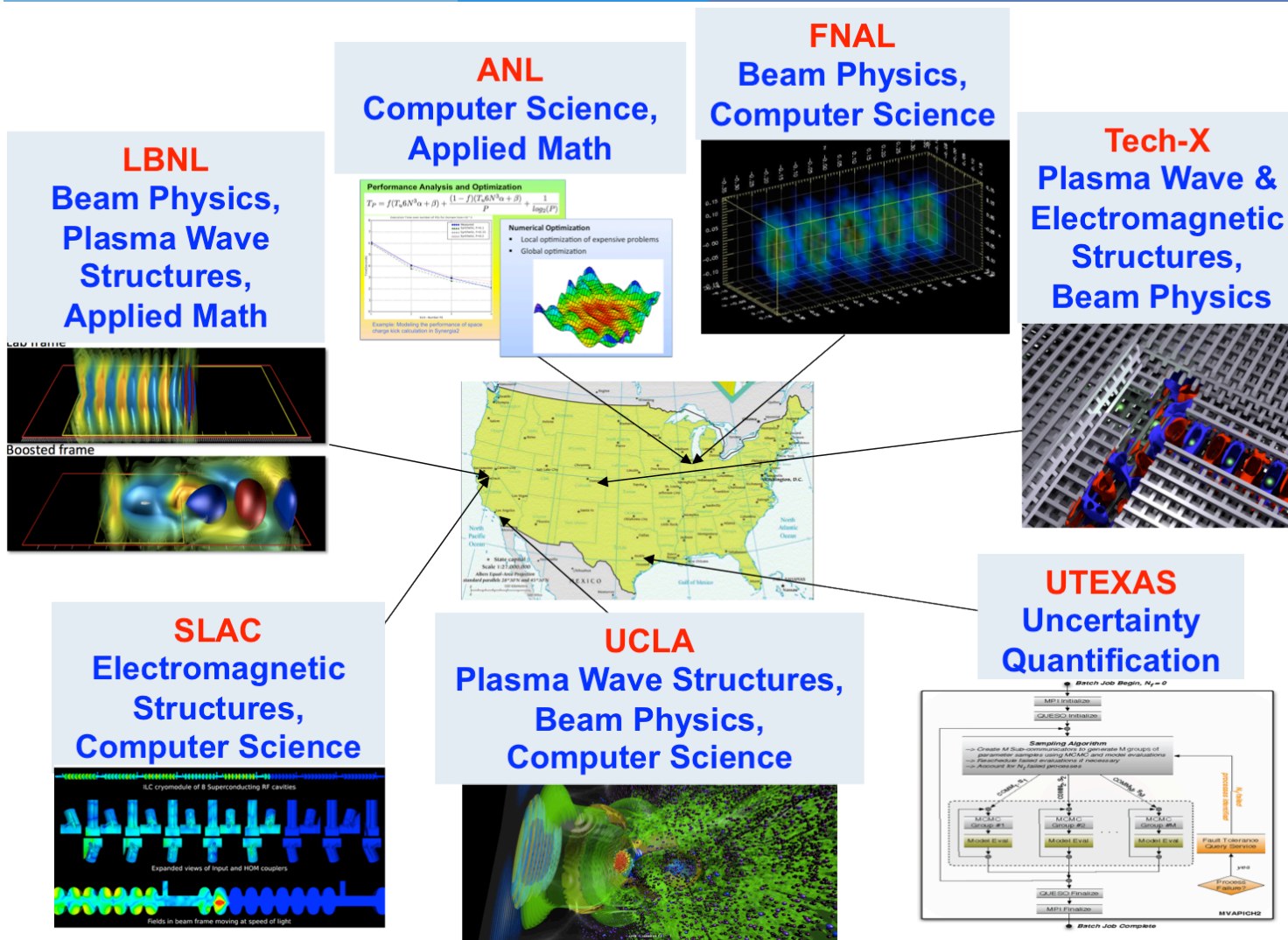




# ComPASS

## High Performance Computing for Accelerator Design and Optimization



ComPASS will develop the HPC tools and accelerator science applications necessary for the design of the next energy and intensity frontier accelerators for High Energy Physics discovery.

## ***The ComPASS Team***

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### ***SciDAC2 site***

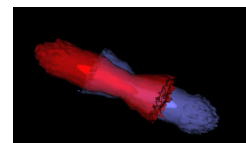
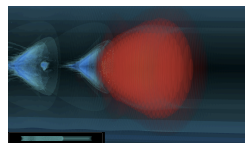
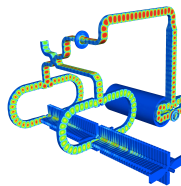
[compass.fnal.gov](http://compass.fnal.gov)

Particle accelerators are critical to scientific discovery both nationally and worldwide. The development and optimization of accelerators is essential for advancing our understanding of the fundamental properties of matter, energy, space and time. In the past ten years, the SciDAC program has delivered high-performance computing (HPC) accelerator modeling tools that have been employed to tackle some of the most difficult accelerator science problems. These codes obtain good scalability and parallel performance efficiency to several tens of thousands of processors.

In the next decade, the high-energy physics (HEP) community will explore the intensity frontier of particle physics by designing high intensity proton sources for neutrino physics and rare process searches, as well as high intensity muon sources for neutrino physics. It will also be exploring the energy frontier of particle physics by operating the Large Hadron Collider, developing novel concepts and technologies necessary for the design of the next lepton collider, and undertaking R&D for new acceleration technologies.

ComPASS will develop the HPC tools and applications necessary to design Project X, the proposed proton driver at Fermilab, the next lepton collider, with either electron or muon beams, and with either conventional or advanced (plasma, dielectric structure) acceleration technology, and perform R&D at FACET and BELLA. It will build on the successful HPC accelerator modeling tools developed under SciDAC1 and SciDAC2 and augment and evolve them so they can drive and support the accelerator science required for the above applications.

ComPASS will rely on the successful collaboration with the SciDAC institutes to develop algorithms and techniques that will take advantage of modern HPC platforms and efficiently utilize many core systems.



### ***Applied Math, CS, and UQ Research Areas:***

Particle in Cell Methods, Fluid Dynamics, Linear Algebra, Performance Optimization, Non-linear Parameter Optimization, Bayesian Analysis, Sampling Algorithms.